



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/624,316

07/21/2003

Rajesh Menon

MIT.9922

7282

7590

07/14/2004

Samuels, Gauthier & Stevens LLP  
Suite 330  
225 Franklin Street  
Boston, MA 02110

EXAMINER

BERMAN, JACK I

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 07/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/624,316	MENON ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jack I. Berman	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11, 12 and 14 is/are rejected.
- 7) ☒ Claim(s) 9, 10 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____.  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/20/03</u> .  | 6) <input type="checkbox"/> Other: ____.                                    |

Art Unit: 2881

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. According to Claim 14, the maskless lithography system comprises “an array of Besel [*sic*] zone plates, each of which focuses an energy beam into an array of images”. However, according to lines 20-22 of the specification:

“It is also known that a Bessel beam may propagate with minimal spreading. By combining the Bessel beam with a focusing element such as a zone plate, one may produce a diffractive focusing with a very large depth-of-focus.”

In other words, the Bessel zone plate cannot focus an energy beam. It only reduces beam spreading to add depth-of-focus to an image formed by another element, such as a zone plate, that performs the actual focusing.

Claims 11 and 12 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a maskless lithography system comprising an array of apodized diffractive elements that have a focusing efficiency of at least 50% or alternating phase photon sieves that have a focusing efficiency of at least 50% and are 100% transmissive, does not reasonably provide enablement for a maskless lithography system comprising any other type of array of diffractive elements that have the claimed focusing efficiency and transmissivity. The specification does not enable any person skilled in the art to which it pertains, or with which

Art Unit: 2881

it is most nearly connected, to make the invention commensurate in scope with these claims. In Figure 10 and the related discussion in the specification, the instant application discloses that apodized zone plates can have focusing efficiencies of at least 50% and beginning on page 16 the specification discloses that alternating phase photon sieves can also have high focusing efficiencies, but there is nothing to establish that no other type of diffractive elements can have focusing efficiencies this high. Any person having ordinary skill in the art attempting to make the claimed invention using any type of diffractive elements other than apodized zone plates or alternating phase photon sieves would have to make these elements with no guidance from the disclosure of the application and then test them to measure their focusing efficiencies. This would constitute an undue amount of experimentation. Similarly, attempting to make the invention claimed in Claim 12 would have to perform an undue amount of experimentation to make diffractive elements other than alternating phase photon sieves that are 100% transmissive.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

Art Unit: 2881

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith in view of Raj. Smith discloses a maskless lithography system comprising an array of Fresnel zone plates, each of which focuses an energy beam into an array of images in order to create a permanent pattern on an adjacent substrate. Smith does not teach to make each of the Fresnel zone plates as a blazed Fresnel zone plate. Beginning at line 36 in column 2, Raj teaches to reduce distortions in a Fresnel zone plate by forming each lens facet with a "blazed-type" pattern. It would have been obvious to a person having ordinary skill in the art to apply the teachings of Raj to the Smith maskless lithography system by forming each of the facets of the Fresnel zone plate as a blazed Fresnel zone plate.

Claims 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith and Raj as applied to claims 1 and 2 above, and further in view of Johnson. Johnson teaches, at lines 34-52 in column 11, to reduce distortion in a maskless lithography system using an array of microlenses by apodizing each microlens aperture. At line 37 in column 13, Johnson further teaches that Fresnel lenses may be used as the microlens elements in the array. It would therefore have been obvious to a person having ordinary skill in the art to apply the teachings of Johnson to the Smith/Raj apparatus discussed above in order to reduce distortion in the manner taught by Johnson. It would also have been obvious to a person having ordinary skill in the art to use any of the various Fresnel zone plates discussed by Raj at lines 30-33 in column 2 as the Fresnel zone plate in the array.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith, Raj, and Johnson as applied to claims 3-6 above, and further in view of Kipp et al. Since Kipp et al. discloses amplitude photon sieves and teaches that they are functionally equivalent to Fresnel zone plates, the use of such photon sieves instead of the Fresnel zone plates used in the Smith/Raj/Johnson apparatus discussed above would have been an obvious substitution of known equivalents.

Claims 9, 10, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:  
Phase photon sieves are not disclosed in the prior art.

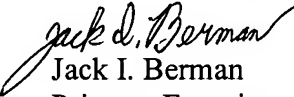
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kronberg discloses Bessel zone plates and teaches how they limit beam divergence.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack I. Berman whose telephone number is (571) 272-2468. The examiner can normally be reached on M-F (8:30-6:00) with every second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571) 272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2881

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jack I. Berman  
Primary Examiner  
Art Unit 2881

jb  
7/11/04